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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/786,499	03/02/2001	Michael Hobson	GJE-0004	1435

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EXAMINER
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THOMPSON, JAMES A

ART UNIT	PAPER NUMBER
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2625

DATE MAILED: 03/23/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/786,499

Applicant(s)

HOBSON ET AL.

Examiner

James A. Thompson

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 29 December 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Response to Arguments*

1. Applicant's arguments, see the Pre-Appeal Conference Request, filed 29 December 2005, with respect to the rejections of claims 1-16 under 35 USC §103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. As per the Office response to said Pre-Appeal Conference Request, the prosecution of the application on the merits is re-opened. Furthermore, new grounds of rejection are made in view of newly discovered prior art. Accordingly, new rejections are given in detail below.

### *Note With Regard to Present Claims*

2. Since there has been some confusion with respect to the recitation of the present claims, Examiner feels that it is expedient to provide the following note:

The claims initially filed were claims 1-15, which were filed on 02 March 2001. On the same day, a preliminary amendment was also filed which amended claims 4, 8, 10, 11, 14 and 15, and added claim 16. No further amendments have been made. Accordingly, Examiner will examine the claims (1-16) based on the preliminary amendment.

### *Claim Rejections - 35 USC § 101*

3. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

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4. Claims 1-16 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Claims 1-16 recite performing mathematical functions on a set of data values. Mathematical manipulations themselves are not patentable. Claims 1-16 do not recite a process, machine, article of manufacture, or composition of matter, and as such are not eligible for patent protection.

***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -  
(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-2, 8 and 10 are rejected under 35 U.S.C. 102(b) as being anticipated by Knaell (US Patent 5,394,151).

**Regarding claim 1:** Knaell discloses altering the coordinate basis of the data and signal from an original coordinate basis (figure 3B and column 8, lines 3-10 of Knaell) in order to produce a prediction function ( $\hat{g}(s)$ ) (column 5, lines 53-65 of Knaell) having a reduced set of variables (column 4, lines 64-66 and column 5, lines 7-10 of Knaell); performing a Bayesian reconstruction (column 6, lines 38-47 of Knaell) capable of operation of positive, negative and complex signal values (column 6, lines 47-56 of Knaell) to produce a reconstruction signal (column 6, lines 57-66 of Knaell); and converting the reconstruction signal back into the original coordinate basis to generate a signal (figure 5B("Display 3-D Image") and column 9, lines 6-14 of Knaell). Three-dimensional

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imaging is performed using two-dimensional images spaced along a curvilinear path (figure 3B; column 4, lines 64-66; and column 5, lines 7-10 of Knaell). Since positive and negative signal values are simply complex values without an imaginary component, the Bayesian reconstruction is capable of operation of positive, negative and complex signal values (column 6, lines 47-56 of Knaell).

**Regarding claim 2:** Knaell discloses that the Bayesian reconstruction is performed using a Fourier basis (column 5, equation 4 and lines 63-65 of Knaell).

**Regarding claim 8:** Knaell discloses that the signal to be reconstructed is an image signal (column 5, lines 53-60 of Knaell).

**Regarding claim 10:** Knaell discloses that the signal to be reconstructed is a radar signal (column 4, lines 64-66 of Knaell).

### ***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 3 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Knaell (US Patent 5,394,151) in view of Clarke (US Patent 5,799,100).

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**Regarding claim 3:** Knaell does not disclose expressly that the Bayesian reconstruction is performed using a wavelet basis.

Clarke discloses reconstruction of images using a wavelet basis (column 10, lines 60-67 of Clarke).

Knaell and Clarke are combinable because they are from the same field of endeavor, namely the reconstruction of images. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use a wavelet basis, as taught by Clarke, rather than a Fourier basis, as taught by Knaell. The suggestion for doing so would have been that a directional wavelet transform has a corresponding Fourier transform (column 9, lines 17-30 of Clarke), and thus a wavelet transform is an alternate transform method for image signal data. Therefore, it would have been obvious to combine Clarke with Knaell to obtain the invention as specified in claim 3.

**Regarding claim 9:** Knaell does not disclose expressly that said image signal is a medical image signal.

Clarke discloses reconstructing an medical image signal (column 11, lines 36-42 of Clarke).

Knaell and Clarke are combinable because they are from the same field of endeavor, namely the reconstruction of images. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to specifically reconstruct a medical image, as taught by Clarke. The suggestion for doing so would have been that the system of Knaell is applicable to 3-dimensional image reconstruction in general. A medical image signal is simply another type of image that can be reconstructed. Therefore, it would have been obvious to combine Clarke with Knaell to obtain the invention as specified in claim 9.

9. Claims 4-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Knaell (US Patent 5,394,151) in view of Puetter (US Patent 5,912,993).

**Regarding claim 4:** Knaell does not disclose expressly that the Bayesian reconstruction employs the maximum entropy method.

Puetter discloses a Bayesian reconstruction (column 3, line 65 to column 4, line 4 of Puetter) that employs the maximum entropy method (column 6, lines 29-33 of Puetter).

Knaell and Puetter are combinable because they are from the same field of endeavor, namely the reconstruction of images using Bayesian reconstruction. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use employ the maximum entropy method in the Bayesian reconstruction, as taught by Puetter. The suggestion for doing so would have been that the maximum entropy method maximizes the most likely combination of image and model, given the acquired data set (column 4, lines 48-51 of Puetter). Therefore, it would have been obvious to combine Puetter with Knaell to obtain the invention as specified in claim 4.

**Regarding claim 5:** Knaell discloses employing an evaluation parameter,  $\alpha$ , which is determined from a prior reconstruction (column 5, line 66 to column 6, line 2 and column 6, equation 3 of Knaell). Whether the evaluation parameter is referred to as  $\alpha$  or  $a_1$  is merely a matter of nomenclature.

**Regarding claim 6:** Knaell discloses employing an evaluation parameter,  $\alpha$ , which is set at a fixed value (column 5, line 66 to column 6, line 2 and column 6, equation 3 of Knaell). Whether the evaluation parameter is referred to as  $\alpha$  or  $a_1$  is merely a matter of nomenclature.

**Regarding claim 7:** Knaell discloses employing an evaluation parameter,  $\alpha$ , which is determined during the reconstruction step (column 5, line 66 to column 6, line 2 and column 6, equation 3 of Knaell). Whether the evaluation parameter is referred to as  $\alpha$  or  $a_i$  is merely a matter of nomenclature.

10. Claims 11-12 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Knaell (US Patent 5,394,151) in view of Hofstein (US Patent 4,099,179).

**Regarding claims 11-12:** Knaell does not disclose expressly that the signal to be reconstructed is an acoustic data signal, wherein the acoustic data signal is an underwater sonar signal.

Hofstein discloses reconstructing an acoustic data signal (column 7, lines 22-30 of Hofstein), wherein said acoustic data signal is an underwater sonar signal (column 7, lines 9-15 of Hofstein).

Knaell and Hofstein are combinable because they are from the same field of endeavor, namely digital image data processing and display. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use sonar signals as the input signal for image reconstruction, as taught by Hofstein. The motivation for doing so would have been to obtain information regarding objects and events below the surface of the water (column 7, lines 9-12 of Hofstein). Therefore, it would have been obvious to combine Hofstein with Knaell to obtain the invention as specified in claims 11-12.

**Regarding claim 15:** Knaell does not disclose expressly that the signal is a communication signal.



Hofstein discloses processing a radio signal (column 6, lines 65-68 of Hofstein), which is a form of communication signal.

Knaell and Hofstein are combinable because they are from the same field of endeavor, namely digital image data processing and display. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use a communication signal as the signal to process, as taught by Hofstein. The motivation for doing so would have been to scan target objects based on the return echoes of said communication signals (column 6, lines 63-65 of Hofstein). Therefore, it would have been obvious to combine Hofstein with Knaell to obtain the invention as specified in claim 15.

11. Claims 13 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Knaell (US Patent 5,394,151) in view of Hofstein (US Patent 4,099,179) and Bahorich (US Patent 5,226,019).

**Regarding claim 13:** Knaell in view of Hofstein does not disclose expressly that the acoustic data signal is a geophysical data signal.

Bahorich discloses processing geophysical data signals (column 3, lines 60-61 and column 4, lines 6-10 of Bahorich).

Knaell in view of Hofstein is combinable with Bahorich because they are from the same field of endeavor, namely digital image data processing and display. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to specifically acquire and process geophysical data, as taught by Bahorich. The motivation for doing so would have been to obtain information about the Earth's structure,

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lithology, geology, and pore fluid content (column 2, lines 53-57 of Bahorich). Therefore, it would have been obvious to combine Bahorich with Knaell in view of Hofstein to obtain the invention as specified in claim 13.

**Regarding claim 16:** Knaell in view of Hofstein does not disclose expressly that the communication signal is a time-series signal.

Bahorich discloses processing a time-series signal (column 2, lines 53-57 of Bahorich).

Knaell in view of Hofstein is combinable with Bahorich because they are from the same field of endeavor, namely image data processing and display. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to specifically use a time-series signal, as taught by Bahorich. The motivation for doing so would have been that time-series signals are useful for extracting a variety of information (column 2, lines 53-57 of Bahorich). Therefore, it would have been obvious to combine Bahorich with Knaell in view of Hofstein to obtain the invention as specified in claim 16.

12. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Knaell (US Patent 5,394,151) in view of Larson (US Patent 5,252,922).

**Regarding claim 14:** Knaell does not disclose expressly that the signal to be reconstructed is a signal from spectroscopy.

Larson discloses reconstructing images from spectroscopy (column 4, lines 25-31 of Larson).

Knaell and Larson are combinable because they are from the same field of endeavor, namely digital image data processing and

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display. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to specifically use spectroscopic imaging, as taught by Larson. The motivation for doing so would have been that spectroscopy can provide spatially resolved discrimination of medical tissue images (column 4, lines 30-35 of Larson). Therefore, it would have been obvious to combine Larson with Knaell to obtain the invention as specified in claim 14.

### ***Conclusion***

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a. "A Generalized EM Algorithm for 3-D Bayesian Reconstruction from Poisson Data Using Gibbs Priors", by Tom Hebert and Richard Leahy, *IEEE Transactions on Medical Imaging*, volume 8, number 2, pages 194-202, June 1989.

b. "Bayesian Classification of Multivariate Image after MAP Reconstruction of Noisy Channels", by Yonhong Jhung and Philip H. Swain, *Proceedings of the 26th Southeastern Symposium on System Theory*, 20-22 March 1994, pages 422-426.

c. Zhang et al, US Patent 6,434,261 B1, Patented 13 August 2002, Filed 23 February 1998.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James A. Thompson whose telephone number is 571-272-7441. The examiner can normally be reached on 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David K. Moore can be

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reached on 571-272-7437. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



James A. Thompson  
Examiner  
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22 February 2006



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